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Front Cover: An underground storage tank is removed from the ground at Naval Training Center Bainbridge, Md. The Maryland Department of the Environment (shown peeping over the hill) reviewed and approved the Navy's removal plan. The tanks and piping were salvaged and disposed of at a junk yard. Cover art by Bill Brack, Naval Facilities Engineering Command Headquarters, Alexandria, Va.

NAVY CIVIL Engineer

Spring 1992 Vol. XXXI Issue 1

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The *Navy Civil Engineer* is published quarterly by the Naval Facilities Engineering Command, 200 Stovall Street, Alexandria, Va. 22332-2300. Telephone: (703) 325-0310, DSN 221-0310.

Subscriptions
Subscriptions to the *Navy Civil Engineer* are available from New Orders, Superintendent of Documents, P.O. Box 371954, Pittsburgh, Pa. 15250-7954. Price: $5.50 per year for domestic and $6.88 for foreign.

Address Changes
Send address changes to editorial and business offices: Naval Facilities Engineering Command, Attn: Editor, *Navy Civil Engineer* Magazine (Code OODA), 200 Stovall Street, Alexandria, Va. 22332-2300. Telephone: (703) 325-0310, Autovon 221-0310.

Authorization
Issuance of the *Navy Civil Engineer* is approved in accordance with the Department of the Navy Publications and Printing Regulations, NAVSO P-35. It does not alter, amend or supersede official regulations, orders, or directives. Printing costs are charged to appropriated funds for maintenance and operations of NAVFAC.

The *Navy Civil Engineer* is intended for the information of regular and reserve personnel of the Civil Engineer Corps, United States Navy, and key civilian employees of NAVFAC, subordinate commands, and other mission-oriented activities.

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Speaking from Topside

There is an old Chinese curse that goes, "May you live in interesting times." For facilities managers, the interesting times may have only just begun. A new world order, declining budgets, base closures and consolidations are only some of the new challenges to be addressed. Meanwhile, existing concerns such as aging infrastructure, environmental restoration and compliance, energy conservation, quality of life and base housing continue to demand the facilities managers' time and attention.

The good news is that, despite a general pronounced trend toward fewer resources, we are getting some support. In the face of a general reduction in military personnel numbers, Civil Engineer Corps billets have remained steady due to our expanding roles in environmental restoration and compliance, base closure and public works center creations and expansions. Recently, Navywide program management of bachelor quarters has been assigned to the Naval Facilities Engineering Command in recognition of our management abilities in family housing. Congress has also begun to recognize the deteriorated state of our facilities and in FY 92 funded a $500 million Defense Real Property Maintenance account to do urgent repairs and to survey maintenance conditions at selected bases.

However, the downsizing of the Department of Defense and the military services will affect the CEC. Essential facilities jobs will be filled. However, gaps in junior officer billets will also occur. In some cases, military assistant public works officers will become civilian deputy PWOs as the major claimants wrestle with reducing officer billets. It will become increasingly important that junior officers receive guidance and on-the-job training from mid-grade and senior officers to prepare them for future assignments as public works officers and staff civil engineers.

In the environmental area we expect that increases in billets, funding and awareness will help us catch up with burgeoning environmental requirements. We hope to move out of the enforcement mode and into a compliance mode. To get there is an enormous challenge. We will be assigning more and more CEC officers to billets in the environmental management field. Graduate education in environment will continue to expand as we train CEC officers for jobs in this arena.

As the Navy draws down, one area that will become increasingly important is the quality of life for our sailors and their families. We need to retain quality personnel to man the shrinking number of billets. Good sailors/Seabees deserve the best we can give them, and we can ill afford to shortchange them. The Chief of Naval Operations has recognized this and has supported creation of a Neighborhoods of Excellence program to significantly upgrade the quality and appearance of our family housing. Similar initiatives for bachelor quarters will be forthcoming.

CAPT William R. Mitchum, CEC, USN

With the overall DOD downsizing, we can expect to have fewer civilian personnel to get the job done. One solution is to contract out the work that is beyond a reasonable backlog. Facility managers will need training to effectively use facility support construction/service contracts. Officers must seek the training to be "warrantable" if they are to qualify as an independent public works officer.

A downsizing Navy will de-emphasize construction and acquisition of new facilities and will greatly heighten the demand for astute facilities management. The CEC and NAVFAC are uniquely qualified to be the vanguard of this shift of emphasis.

William R. Mitchum
Captain, CEC, USN
Deputy Commander for Public Works,
Naval Facilities Engineering Command

Typical underground storage tanks removed from NTC Bainbridge.

UST Removal at NTC Bainbridge Is a Success Story

By George Clouden
and
Ned Pryor

The Navy's successful program to remove abandoned underground storage tanks from Naval Training Center Bainbridge, Md., was cost effective and environmentally sound. This article gives an overview of that program.

NTC Bainbridge encompasses approximately 1,300 acres in Cecil County, Md., 80 miles north of Washington, D.C. The center served as the training facility for more than 450,000 Navy recruits from 1942 to 1976, and provided service schools for gunner's mates, radiomen, yeomen, fire control technicians, nuclear power personnel and many other service ratings. NTC Bainbridge provided medical care to untold numbers of World War II personnel in its 700-bed hospital. The U.S. Naval Academy Preparatory School was also located at NTC Bainbridge.

NTC Bainbridge graduated its last students in 1974, and base operations were phased out in 1976. A Navy caretaker has been present on the site since 1976 to oversee the closure of the former training center. Environmental concerns at the center were raised by state and federal regulators in 1975 and the plans for excessing the property were put on hold.

The future of NTC Bainbridge is of great interest to federal, state and local officials. This interest was demonstrated in 1986 when the U.S. Congress enacted Public Law 99-576. The law authorized the Secretary of the Navy to dispose of NTC Bainbridge by sale to private parties or transfer to other governmental agencies after restoring the property to meet all applicable federal and state of Maryland environmental regulations.

George Clouden is the head of the Oil and Toxic Substance Control Act section at the Chesapeake Division, Naval Facilities Engineering Command in Washington, D.C. Ned Pryor formerly worked as an environmental engineer at the Naval Facilities Engineering Command Headquarters in Alexandria, Va.

DERA study

In September 1987, the Navy initiated a Defense Environmental Restoration Account-funded study to investigate potential environmental problems at NTC Bainbridge. The study focused on three key areas:

- Past disposal operations at the base landfill and firefighting training facility
- Asbestos-containing materials in buildings
- Underground storage tanks

NTC Bainbridge had 203 abandoned USTs, containing more than 300,000 gallons of product and water. The majority of the tanks were used to store heating fuel for oil burners and boilers. However, 24 tanks stored motor fuels, used oil or solvents. All USTs were constructed from bare steel (unprotected from corrosion).

The Atlantic Division, Naval Facilities Engineering Command, Norfolk, Va., contracted with VERSAR, Inc., of Springfield, Va., to conduct a site assessment of the USTs at NTC Bainbridge and develop environmentally acceptable options for closing and remediating the UST sites. (Project management for the environmental programs at NTC Bainbridge was transferred to the Chesapeake Division, Naval Facilities Engineering Command, Washington, D.C., in 1989.)

The state of Maryland regulates the operation and closure of all the USTs at NTC Bainbridge. (The heating oil tanks are exempt from the Environmental Protection Agency's

Resource Conservation Recovery Act underground storage tank regulations.) State of Maryland UST regulations, administered by the Underground Storage Tank Division of the Maryland Department of the Environment (MDE), require that tanks taken out of service for more than 180 days be removed permanently or specific MDE requirements must be met for the tanks to be abandoned-in-place.

The Navy concurred with VERSAR's recommendation that all the abandoned USTs be removed from the ground. This plan was more cost effective than testing the tanks to determine if they were leaking and then abandoning them in-place. Removal would also allow the state inspectors to examine the tanks and excavations. Clean Harbors, Inc., of Kingston, Mass., was awarded a contract in September 1989 to remove all UST systems. Simultaneously, the existing LANTDIV contract was modified to task VERSAR to perform Title II inspection and other services for the tank removal contract.

In December 1989, after CHESDIV approved Clean Harbors' UST removal plan, health and safety plan, and sediment control plan, tank removal began at NTC Bainbridge. By September 1990, all abandoned UST systems had been removed and restoration of the tank sites was complete. In all, 203 UST systems were removed, consisting of: 179 heating oil tanks (numbers two, four and six oils), seven motor fuel tanks (gasoline and diesel) and 17 tanks containing other products (solvents and used oils). All tank removals were coordinated with the Underground Storage Tank Division of MDE. Each step had to be inspected and approved by an MDE representative. The sequence of tank removal was:

- Pump product from tank
- Uncover top of tank and open manway

The decision to remove the abandoned UST systems rather than the alternative of tightness testing and abandonment-in-place resulted in a savings of several million dollars.

- Take oxygen readings for confined space entry
  - If readings are sufficient, enter and clean the tanks
  - If readings are insufficient, pump air in first
  - If tank contains highly volatile product, use dry ice to remove vapors
- Exercise sediment control
- Excavate tank and piping from ground
- Place tank, piping and soil on plastic
- Cut up tank and piping
- Take soil samples for volatile organic compounds and total petroleum hydrocarbons analyses
- If soil sample results are acceptable, backfill
- Plant grass seed

MDE required monitoring pipes to be installed in tank excavations where the levels of contamination were low or non-existent. Air samples analyzed from these pipes were negative. This satisfied MDE. Groundwater monitoring wells were installed down-gradient from highly contaminated tank excavations.

The wells will be sampled and analyzed until the MDE is satisfied that the threat of possible groundwater contamination no longer exists. Of the total number of tanks removed, 97, or approximately 48 percent, were determined to be leakers. The primary cause of soil contamination was due to leakage resulting from tank corrosion.

The total volume of contaminated soil removed from UST excavations was 3,000 cubic yards: 2,620 cubic yards from heating oil tanks, 260 cubic yards from motor fuel tanks and 120 cubic yards from other tanks. The average was 14.8 cubic yards per tank. CHESDIV's original estimate was 10 cubic yards per tank. All contaminated soil was transported to a staging area where it was segregated for future disposition.

After soil analyses determined that contaminates were well below acceptable limits and upon approval of MDE, the gasoline-contaminated soil was landfarmed on an existing concrete pad located at the activity. The soil contaminated with heating oil was treated with a cold asphalt mix and then spread and rolled on an existing asphalt drill field located at the activity. No contaminated soil was removed from the activity.

The total number of tanks removed represented a total capacity of 1,034,850 gallons of petroleum products, with the average tank capacity being 5,000 gallons. Physical separation of the approximately 300,000 gallons of product and water that was recovered from the abandoned tanks yielded more than 200,000 gallons of product.

The recovered product was transported to a reclamation site in Kingston, Mass., for recycling, and the water fraction was transported to Baltimore, Md., for treatment. The total cost for the tank removal program was more than $2 million.

Cost savings

The decision to remove the abandoned UST systems rather than the alternative of tightness testing and abandonment-in-place resulted in a savings of several million dollars. The decision to remove the tanks also enhanced the Navy's working rela-

Continued on page 25

Non-Friable Asbestos Removal: Let's Try Some Innovative Methods

By Richard H. Caldwell

The Navy, in conjunction with the other military services and various government agencies, is participating in an Asbestos Development and Demonstration Initiatives Group. ADDIG's goal is to research and develop more cost-effective and energy-efficient methods for asbestos management.

Field demonstrations and programs on methods of non-friable asbestos containing material (ACM) removal, replacement and disposal are being implemented by ADDIG. The test programs monitor, collect air samples and test for air-borne particles that might be released during various methods of controlled ACM removal.

Safety is emphasized in the asbestos removal test programs. Removal personnel wear protective clothing and equipment as a precautionary measure. The personnel are monitored for possible exposure to asbestos fibers, in conformance with federal and state laws and regulations. Asbestos particle identification and count is accomplished using polarized light/dispersion staining microscopy with follow up analysis by trans-

Richard H. Caldwell is a civil engineer at the Northern Division, Naval Facilities Engineering Command in Philadelphia, Pa.

A dry demolition of a wooden barracks at Ft. Bliss, Texas.

mission electron microscopy and/or scanning electron microscopy, as may be necessary.

Field investigation

During the month of August 1990, an ADDIG work committee investigated removal of vinyl asbestos and asphalt asbestos floor tile from selected buildings at Ft. Sill, Okla., using procedures including:

- Wet and dry removal by hand, exercising ordinary care
- Aggressive dry removal from wood and concrete floors by hand, using maximum workers to accomplish removal task in minimal time
- Strip with power stripper using commercial strip liquid and stripper pad
- Water soak with amended water and hand remove
- Power removal by commercial removal methods
- State-of-the-art techniques to remove mastic from wood and concrete floors
- Grind to remove mastic (wet sand and power grinder)

When the test buildings contained friable and non-friable ACM, the friable material was removed and disposed of by conventional methods. Then the controlled removal of the non-friable ACM was accomplished. The asbestos removal tests were performed in enclosed and sealed cells constructed of wooden frames covered with heavy mil plastic sheet material. There were seven test cells, each approximately 13 feet 6 inches by 25 feet by 8 feet 4 inches height. The floor tiles were tightly adhered to a concrete base slab in a large room which had been used as a gymnasium. Additional tests were done in World War II-era barracks where tiles were installed on plywood sheet material over wooden floors.

The air samples taken during the various non-friable ACM test removals, approximately 900, are being analyzed and evaluated. Preliminary test results are encouraging, with fiber counts within legislated and established standards. If the final sample test results confirm compliance with these laws and standards, substantial savings could be realized by removing vinyl asbestos floor tile from Navy buildings without requiring that negative air containment enclosures be erected.

Isolating the removal work area from adjacent occupied areas most likely will be recommended. Isolation can be accomplished by covering all openings (such as doors, windows and vents) leading from the work area with sheet plastic or a similar material. Contractor removal personnel must wear protective clothing and equipment as a precautionary measure.

Power grinding removal of floor tile mastic from a concrete slab at Ft. Sill. The operator is wearing protective clothing and working in a typical test cell. Air sampling filters are shown suspended from an overhead.

Fiber release during demolition

In early November 1991, an ADDIG work committee directed the demolition of eight World War II two-story wooden barracks at Ft. Bliss,Texas, to determine, measure and evaluate the potential and extent of asbestos fiber release during building demolition.

The buildings contained non-friable asbestos floor tile, mastic and caulking materials. The tile was approximately 20 percent Chrysotile, as determined by PLM and confirmed with SEM and energy dispersive X-ray analysis. The mastic contained greater than 15 percent asbestos. The buildings also had extensive vinyl asbestos floor tile on a wood substructure. Additionally, all friable asbestos materials found were removed. The demolition proceeded with both up and down wind air monitoring and sampling.

There have been some concerns about the removal of vinyl asbestos-containing floor tile and asbestos-containing mastic before demolition of buildings. These concerns have been about cost and impact on the environment and adjacent areas. Data on asbestos removal projects using phase contrast microscopy (PCM) to determine worker exposures and containment concentrations of airborne asbestos fibers are available. However, specific studies to measure

Costs for asbestos surveys, assessments, abatement and disposal will continue to rise unless cost-effective and labor saving alternatives are developed to improve and streamline ACM management.

the potential release of these fibers during demolition, loading, hauling and landfill disposal are limited.

Building demolition was performed with a backhoe fitted with a demolition claw bucket. Debris was loaded into 10 wheeler dump trucks by a front end loader. There was no effort to control dust, other than complete operation cut off at wind speeds greater than 15 mph. The building and the debris weren't wetted down.

A building demolition took one to three hours, and loading and disposal of the debris took five to eight hours. Samples were collected both upwind and downwind of demolition and truck loading activities for each building. Samples were also collected during transportation and at the landfill disposal site. Samples were collected on truck drivers, laborers and equipment operators.

Of particular interest, within each building there was fiberglass and wool insulation to serve as an indicator during demolition, loading and transportation of debris.

It was expected that airborne concentrations of non-asbestos fibers would be evident in the test results. Filter preparation and fiber structure classification was according to AHERA analytical protocol, rules and regulations. No structures with a total length less than 0.5 microns were included in the counts.

Test results showed no significant increase in airborne asbestos fiber concentrations when upwind and downwind concentrations were compared from time periods during demolition and loading. Measured airborne asbestos levels were low in all upwind samples and in downwind samples that were biased toward demolition, loading and dumping operations.

There was visible evidence of other airborne fibers, as expected, in downwind samples.

Neither PCM or TEM showed the presence of airborne asbestos when measured immediately adjacent to the demolition and loading activities where vinyl asbestos floor tile and asbestos containing mastic were present.

Future phases of this nonfriable asbestos demonstration program will look at these ACM removals:

- Transite sheeting, flat and corrugated
- Caulking around windows and doors
- Asbestos containing paints and soundproofing
- Roofing materials
- Possible test burning of a structure containing nonfriable asbestos materials (pending EPA permission)

Technology evaluation

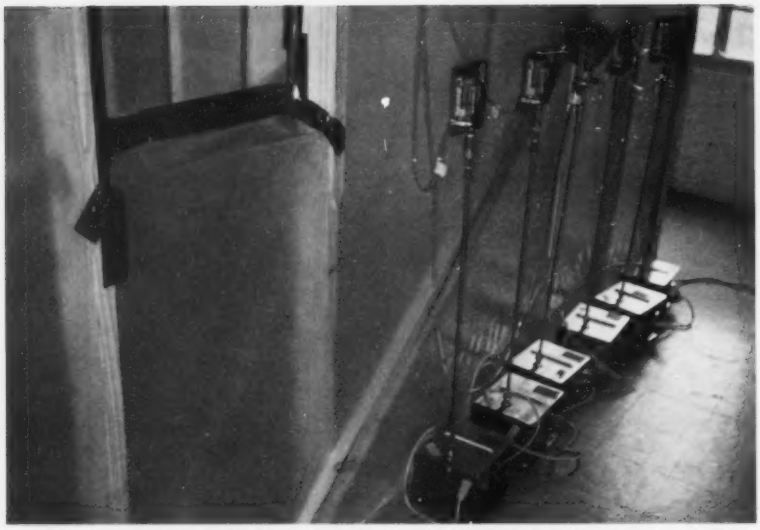
ADDIG's goal is to develop safe and economical methods of removing nonfriable ACM from buildings. ADDIG is exploring technology development in these areas:

- **Computer-aided surveys.** Labor accounts for approximately 50 percent of survey costs. Use of a computer could reduce labor costs. Also, develop portable, interactive, user-friendly hardware and software systems that incorporate computer-aided drafting and design elements.

- **Real-time bulk sample identification.** Develop an instrument to field identify and quantify asbestos content in lieu of polarized light microscopy.

- **Real-time airborne asbestos measurement.** Research the efficiency of existing instrumentation and develop more economical alternative instrumentation.

- **Evaluation of the friability of ACMs.** Develop a methodology or technology to objectively measure the potential for fiber release of ACMs. Substantial savings would be realized by correctly setting priorities for corrective actions and eliminating un-



Typical air sample monitoring pumps located outside a test cell at Ft. Sill, Okla.

necessary ACM remediation procedures.

• **Asbestos abatement.** Cut abatement costs through the use of new methods and technologies, and energy-efficient materials. The National Emission Standard for Hazardous Air Pollutants requires that ACM be removed before demolition to comply with the "no visible emissions" regulation. R&D is needed to determine if the goal of no visible emissions can be obtained without total abatement of ACM.

New energy efficient, nontoxic products must be developed to replace asbestos as it is removed. Most insulating materials currently on the market consist of fiberglass, foam or a form of calcium silicate. These materials generally are not as energy efficient as the original ACM. Isolation procedures and encapsulation materials and methods should be researched.

• **Asbestos detoxification.** Neutralization of the hazardous properties of asbestos would solve many of the problems associated with ACMs. Chemical or physical alteration of ACM to alter fiber size, aerodynamic properties or chemical constituency could minimize its health risk.

• **Risk management and economic aspects.** The risk to employees' health is not necessarily decreased because ACMs have been removed. Abatement of the material potentially can result in high airborne fiber concentrations.

Does this risk outweigh the dangers encountered if the ACM was left undisturbed and mitigated by encapsulation or O&M ACM management programs? The magnitude of the health concerns and the economic implications demand that careful research be applied to this area.

• **Innovative abatement proposals from contractors.** The federal government could sponsor the testing of new contractor-proposed methodologies by funding demonstration projects at federal facilities. Since abatement contractors derive much of their profit from the labor intensive aspect of ACM abatement work, there is little incentive for them to develop and/or fund new labor saving methods.

• **Alternative methods/technologies in lieu of containments.** Construction and demolition of containments may represent up to 20 percent of asbestos abatement costs. Research under what conditions asbestos abatement can be conducted without large scale construction of containment enclosures.

• **Disposal options.** Traditional methods involving the bagging and/or containerizing of ACM followed by burial in a designated landfill, while currently permitted, pose some long-range problems that should be addressed. Liability is always the responsibility of the generator, who for naval installations is the Navy. Optimum solutions would be the treatment of the asbestos waste to render it nonhazardous before disposal or conversion of the ACM to a nontoxic, more energy efficient form that could be used as an insulator, thus eliminating the need for disposal.

Based upon existing and proposed federal and state asbestos regulations, it is apparent that all abatement activities associated with ACM management will become more regulated and complex.

Costs for asbestos surveys, assessments, abatement and disposal will continue to rise unless cost-effective and labor saving alternatives are developed to improve and streamline ACM management.

Alternative procedures for the abatement of ACM and the development of new technologies and materials must be achieved through innovative technology development.

This technology development will require a strong and integrated programmatic approach with federal agencies and the private sector working together in coordinating technology development efforts to attain the safest and most efficient ACM abatement methods with optimum cost impact. ❑

Carrier Wharf Repairs Will Lead to a Long Service Life

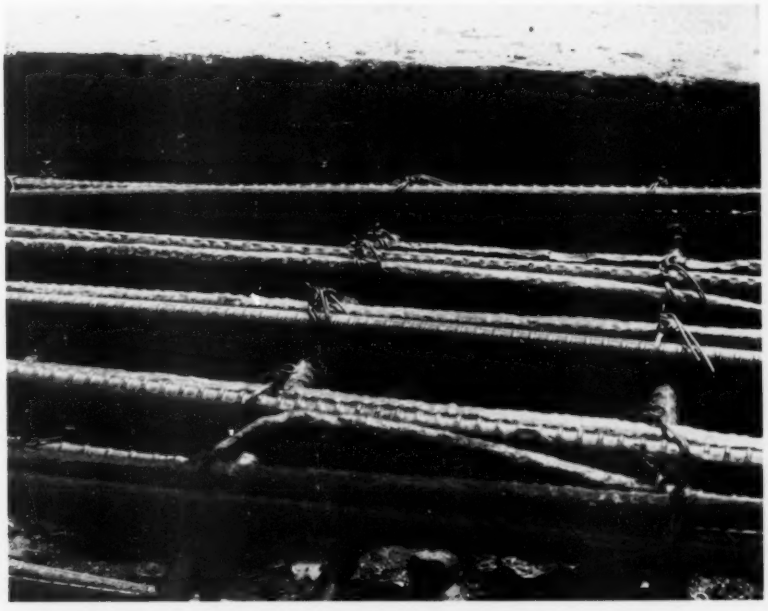
Repairs to the Leyte Wharf at NAVSTA Subic Bay, Phillippines

By Thomas Tehada

The carrier wharf at Naval Station Subic Bay, Philippines, will no longer be used by the U.S. Navy when the U.S. Navy bases are closed in the Philippines. However, the technology used on the wharf is good and can be applied at other Navy waterfront facilities.

The carrier wharf, commonly known as Leyte Wharf, was constructed in 1955. An open type wharf, it has a reinforced concrete deck (36,672 square feet) and four mooring platforms. The wharf has reinforced concrete beams supported on concrete jacketed steel piles.

Since its construction, the wharf has undergone numerous repairs. Major repairs to the concrete deck were completed in 1985, and another major deck repair project was accomplished in 1988.



A view of the plane of delamination on the carrier wharf.

The repair method used for these projects included epoxy grout patching of spalls and cracks.

The patchwork was ineffective due to poor bonding to the existing concrete and deterioration around the edges.

During construction of the last repair project in 1988, a survey of the deck revealed that almost the entire top portion of the deck was delaminated to a depth of 3 inches—the depth of the top layer of rebars. The lower portion of the deck was in sound condition.

The rebars in the upper layer were corroded. The wharf was still usable for berthing carriers, but the deck load capacity was reduced to 40 percent of the design capacity.

Analysis of concrete core samples from the deck indicated that the chloride concentration in the concrete well exceeded the threshold limit of 1 pound per cubic yard of concrete, at which point corrosion of the rebar

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becomes activated.

Also, potential testing between the rebar and the concrete indicated that about 78 percent of the deck was undergoing possible corrosion activity.

Chloride contamination

Chloride contamination of the deck is inevitable in a marine environment; however, the major cause of the chloride contamination of Leyte Wharf is suspected to be from the large amount of saltwater that is flooded onto the deck during periodic testing of the saltwater system.

Heavy usage of the wharf required that the damage caused by the chloride contamination be repaired to make the wharf fully operational. Several repair schemes were analyzed:

A. Continue patching

B. Replace the delaminated top concrete layer of the wharf only

C. Replace the delaminated top concrete layer of the wharf and provide cathodic protection

D. Replace the entire wharf deck

E. Convert the wharf from an open type to a closed type by encasing the wharf with sheetpile and filling the space beneath the existing deck

Major considerations in determining the repair solution included:

- Cost
- 25- to 30-year useful life
- Minimal wharf downtime
- Capability of using the wharf for its full designed load

After reviewing all data and evaluating the economics of each option, alternative C (removal of the top 4 inches of the entire concrete deck, replacement with a new layer of concrete, and installation of cathodic protection to protect the deck reinforcing steel) was chosen.

Previous attempts at patching (alternative A) were ineffective. Alternative B was considered inadequate since the significantly high concentrations of chloride in the concrete would still allow corrosion of the rebar in the bottom layer of the deck to continue. Also, the corrosion cell formed between the top layer of rebar in new chloride free concrete and the bottom layer of rebar in the chloride contaminated concrete could further accelerate the corrosion of the bottom layer rebar. The other options were not considered feasible due to their comparatively higher costs.

During construction, the delaminated layer of concrete was removed by high pressure waterblasting. Two methods for removing the concrete were considered: chipping hammers and high pressure water blasting. The high pressure water blasting method was selected since this method would be faster, would remove all unsound concrete, and would not impose additional damage to the remaining concrete and the reinforcing steel.

The original design for repair called for installation of the cathodic protection anodes prior to pouring the new layer of concrete. However, delays in concrete removal and material delivery, the oncoming rainy season, and the operational need for the wharf, mandated that the new layer of concrete be poured without the anodes. The design was modified to install the anode system on top of the new layer of concrete.

The cathodic protection system installed to protect the reinforcing steel was of the impressed current type. The anode mesh consisted of a mixed metal oxide coating on a titanium substrate manufactured into a form similar to expanded metal mesh. This mesh was rolled out to cover the deck and then overlayed with a 2 inch layer of concrete.

The cathodic protection system is energized by two rectifiers. Rebar probes and permanent reference cells were installed in the concrete to monitor the effectiveness of the cathodic protection system.

Good bonding between old and new concrete and proper operation of the cathodic protection system also required this work to be done before pouring the new layer of concrete:

- All rebars and other metals in the concrete were bonded together so they would not be adversely affected by the new cathodic protection system.
- The top layer of rebars were sandblasted and coated with epoxy to reduce the cathodic protection current required for top rebar layer and allow better current distribution to the bottom layer of rebar.
- The old concrete surfaces were sandblasted to remove surface contaminants and provide a clean surface to make a good bond with the new concrete.

Final test results of the cathodic protection system indicated that adequate protection is being provided to the top and bottom layers of rebars. In addition, to minimize the amount of chlorides from entering into the new concrete deck surface, it was recommended that the flow of saltwater be directed into the ocean when performing periodic testing of the saltwater system.

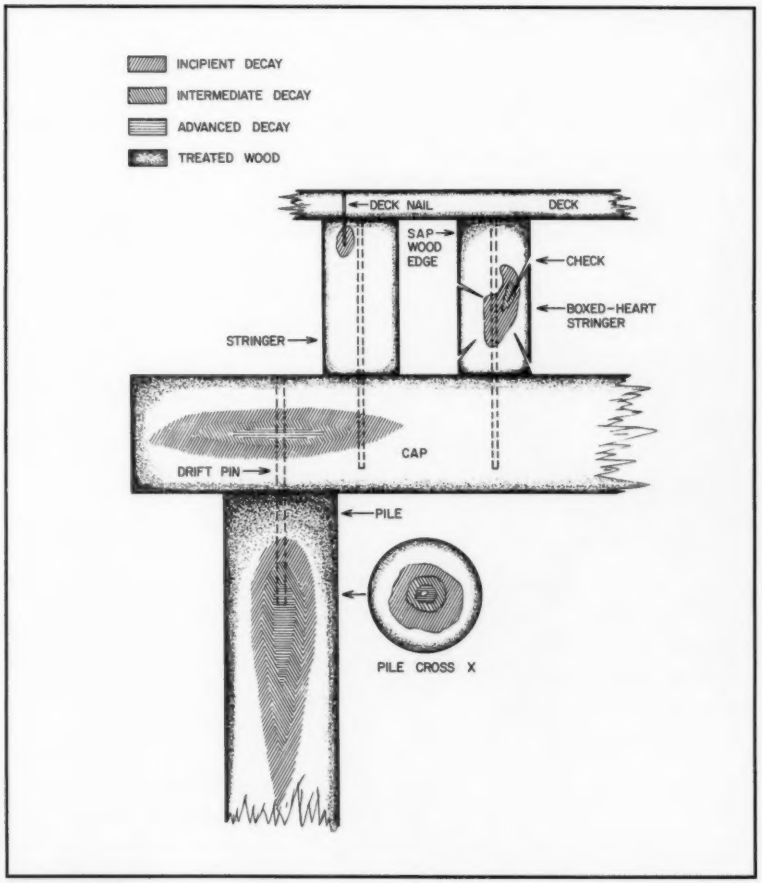
By applying appropriate repair and corrosion control methods, eliminating the causes of corrosion, and properly maintaining the cathodic protection system, the newly repaired wharf should have a full service life. ❑

Wood: A Guide to a Long, Useful Life

By Peter J. Egan, Ph.D.

Wood products and structures (such as utility poles, marine piles, piers, railroad ties and decks) should be pressure treated with chemicals to protect the wood from premature failure caused by decay, insects and marine borers. Knowledge about wood, the organisms that attack it, the chemicals used to protect it, and its end use all influence decisions when selecting the appropriate treated wood products.

Schematic drawing of typical wood bridge construction showing likely locations where decay could develop.



Risk assessment

Many things can influence the life expectancy of wood in service. Misuse and abuse of wood are physical factors that will accelerate wear and cause premature failure. Structures are designed to carry specific loads. When loads are exceeded, early failure results. Marine piles that are rammed by ships, utility poles that are rubbed against by heavy vehicles and wood decks that are gouged by heavy equipment dragged across them allow decay organisms to get into the unprotected interior and begin the deterioration process.

Living organisms such as decay fungi, insects and marine borers require moisture and warmth to grow and multiply. Wood in warm, moist conditions is at the highest risk. Extremes of cold, heat, dryness or wetness are less favorable for the development of these organisms.

In the warm southern United States waters and tropical waters, wood in service is at high risk from marine

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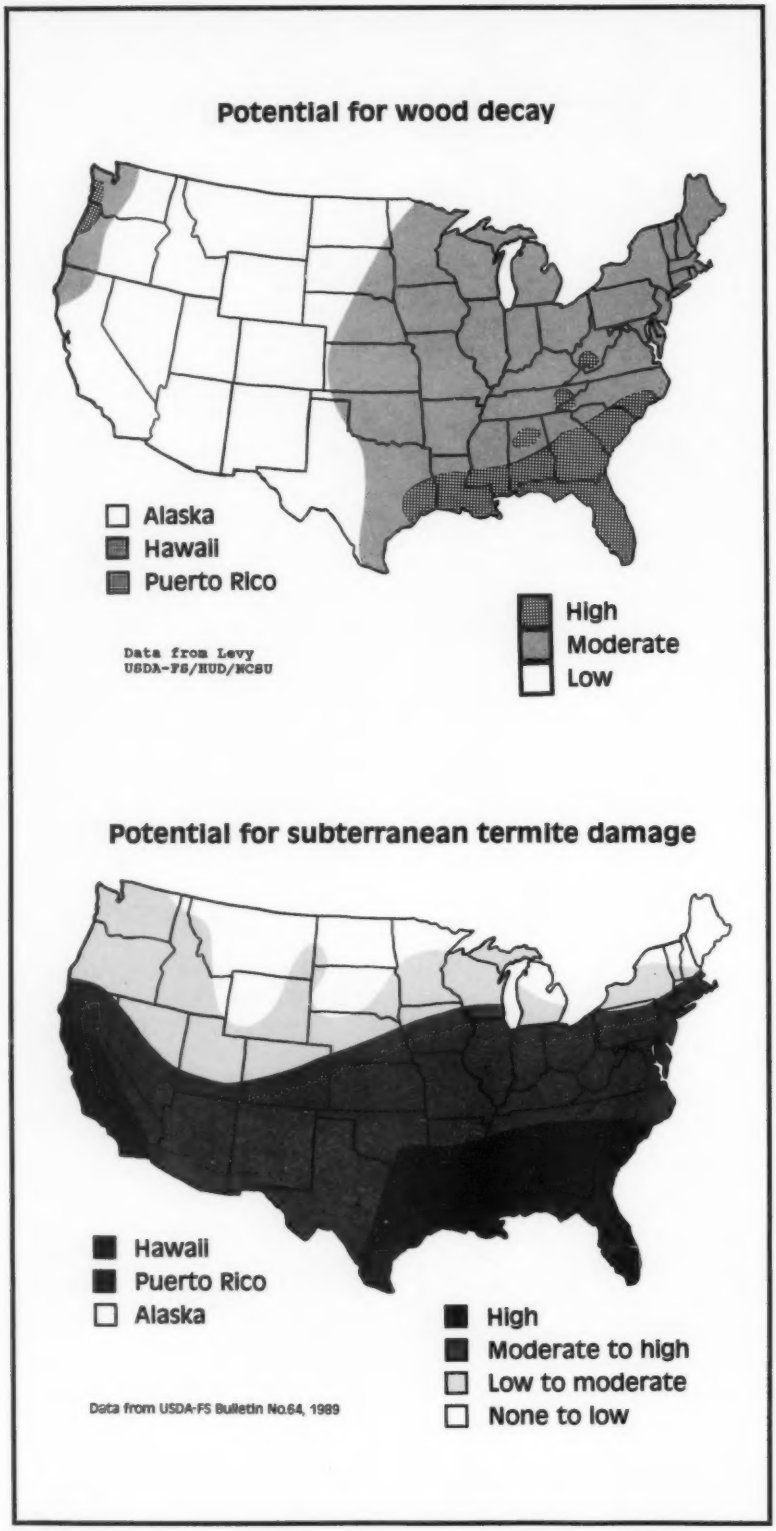
Peter J. Egan, Ph.D., was the wood protection program manager at the Naval Facilities Engineering Command Headquarters in Alexandria, Va.



borers. Even Puget Sound, fed by the warm waters of the Japanese current, is favorable for marine borer attack. Cold waters and polluted waters are less favorable for the growth of these organisms.

The conditions to which wood is exposed can greatly affect the actual service life of the wood. For example, wood in service in the dry Southwest is at low risk and will normally last a long time. While the temperature is warm and favors insect and decay fungi, the weather is usually so dry as to be unfavorable for insect and fungi growth. However, if moisture were to be available, from streams, lawn watering, and other such sources, the risk level would go from low to high. Local weather conditions must always be considered to get a realistic idea of expected wood service life.

Maintenance programs

The secret to longevity of wood products is to use properly treated wood and maintain it. A program of periodic inspection and maintenance will quickly pay for itself.

Ground line maintenance of utility poles is a good example of how a periodic maintenance program on utility poles can save big bucks. Average change out, or replacement, cost for a utility pole is $1,500, which includes cost of pole, equipment and labor. On the average, a pole lasts for 30 to 35 years. A ground line maintenance program with inspections every 10 years with treatment when necessary can easily double the life of a pole.

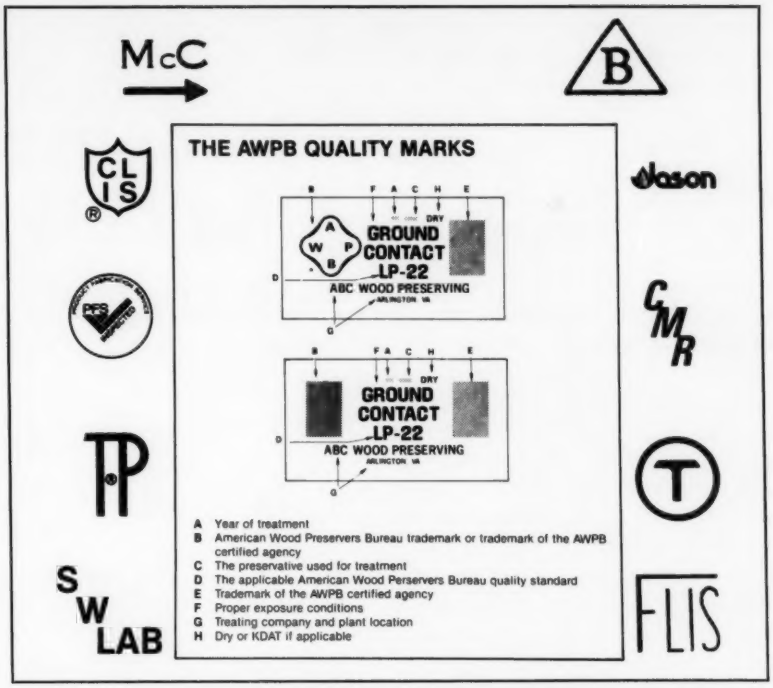
The cost per pole is $30 for each 10-year inspection and treatment. So, it costs $180 for six inspections and treatments to maintain a pole over 70 years. The $180 is a considerable savings over the $1,500 replacement cost.

The cost of a wood pole is inexpensive as compared to the cost for labor and equipment to change out

from the old to the new pole. Even a severely decayed pole can often be braced, saving the cost of replacing it. The cost of the maintenance program is about one-tenth of a replacement pole and change out.

The example provided for utility poles can be applied to marine piles, wood antenna poles, railroad ties and other wood products. Replacing a pole in an antenna array can be much more expensive than changing a utility pole. Labor and equipment costs really skyrocket because so much work needs to be done to disconnect a pole from its neighbors. High replacement costs point out the need for preventive maintenance to avoid all the truly unneeded expense.

Many problems with wood decay, insects, and marine organisms are not readily visible to the untrained eye. The Navywide wood protection program can provide the technical expertise for inspecting wood structures.



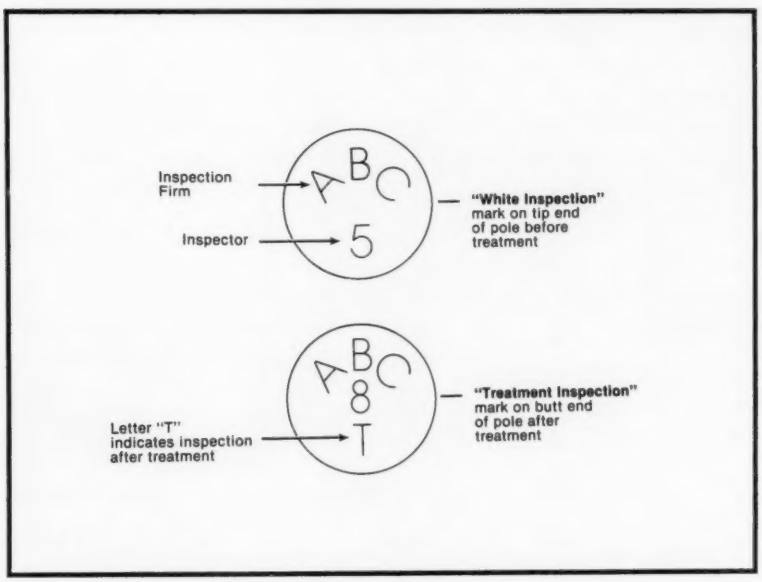
Quality marks used by the American Wood Preservers Bureau and stamps of AWPB-certified inspection agencies.

Untreated wood products

Some tropical hardwoods are classified as naturally resistant to decay, insects and marine borers. However, NAVFAC does not recommend the use of so-called "resistant woods." The heartwood of these species of trees may possess some degree of resistance, but resistance is not easily quantified or quality inspected. Some Navy activities have had bad experiences with premature failure of these so-called naturally resistant materials.

Quality management

The American Wood Preserver's Association has written standards that prescribe the minimum level of chemical preservative that must penetrate the wood to provide a suitable product. In addition to treatment standards, AWPA has published inspection and marking standards, M-1 and M-6. These require that each piece of treated wood be marked with a tag or stamp that provides the customer basic information such as the company that treated the product and the treatment standard, retention value and type of chemical preservative used. Each



Examples of hammer marks used on poles.

piece of material must be marked, accept no less! Marked wood will help prevent the accidental use of wood for a purpose for which it was not intended.

NAVFAC guide specifications, manuals, and field guides provide information on the appropriate AWPA standards to request a specific treated wood product. Wood protection training, additional information, and specification assistance can be obtained by contacting the NAVFAC engineering field division applied biology program.

NAVFAC guidance in obtaining and using wood products requires specifying the appropriate commodity standard (AWPA, C standard) for type of product. The wood must be marked in accordance with AWPA standards M-1 and M-6. Further, all wood products procured for Navy construction and repair projects must be inspected under a three-tiered quality assurance program.

This means quality checks are conducted on the product by the treating plant, an inspection agency, and finally a certifying agency such as the American Wood Preservers Bureau, the wood quality control program of the National Rural Electrification Cooperative Association or an equivalent program.

Through stamps, tags and marks these quality assurance programs certify that the particular wood product was treated in accordance with the marked AWPA standard and the products were routinely checked to ensure that standards of quality were maintained.

•••

Wood is a simple renewable material that must be used and maintained properly. Technical assistance, training and reference materials are available through the applied biology programs at NAVFAC's engineering field divisions. ❑

Modern Elevators: They're Quiet, Brainy and High Tech

The Lowdown on Elevator Upkeep

By Francis "Mac" McCamley

It's 2:13 in the morning and the only sound in the elegant, marbled lobby of a high-rise deep in the financial district of Washington, D.C., is the whirring of a floor polishing machine. The young operator is swinging the spinning device from side to side with great abandon. On one of the oscillations, the polisher collides with the car door of a parked passenger elevator.

The operator doesn't even glance to see if any damage was done. In fact, the heavy polisher has broken the covering trim of the door's reopening device and has shorted the chassis to ground, blowing a fuse. This elevator will be in no condition to respond to the crowd of passengers when the 7 a.m. rush hour arrives.

At 2:14 a.m. in a sleepy little Connecticut town, a light flashes on a control panel. A technician takes the information that an elevator had been disabled some 300 miles away. Checking his building identification sheet he notes that it is important to have this elevator back on line before the start of the workday.

He contacts dispatch and at 2:20 a.m., a phone rings in an elevator technician's bedroom in Northern Virginia. The groggy mechanic jots down the details, dresses and begins his drive through deserted streets to the office building in Northwest Washington.

By 4 a.m., the damaged elevator has been repaired and is back on line. The technician is returning to his home, and with three hours to spare all the elevators in the building are ready for the morning rush. This entire operation has transpired without the knowledge of any of the building's personnel.

This is not some futuristic, imaginative article similar to the "autogyro in every garage" stories that regularly appeared in popular science magazines in the 1930s and 1940s. This scenario has been duplicated over and over in recent times.

Francis "Mac" McCamley was the vertical transportation equipment program manager at the Chesapeake Division, Naval Facilities Engineering Command in Washington, D.C. He passed away early this year.

It hasn't always been this way

Progress in the world of elevators had long been evolutionary, with most improvements and changes being accepted grudgingly. An elevator mechanic from 1910 transported 65 years into the future would not find too many surprises. The mechanic would have a good chance of being hired and working as a troubleshooter for most of the elevator companies doing business in 1975.

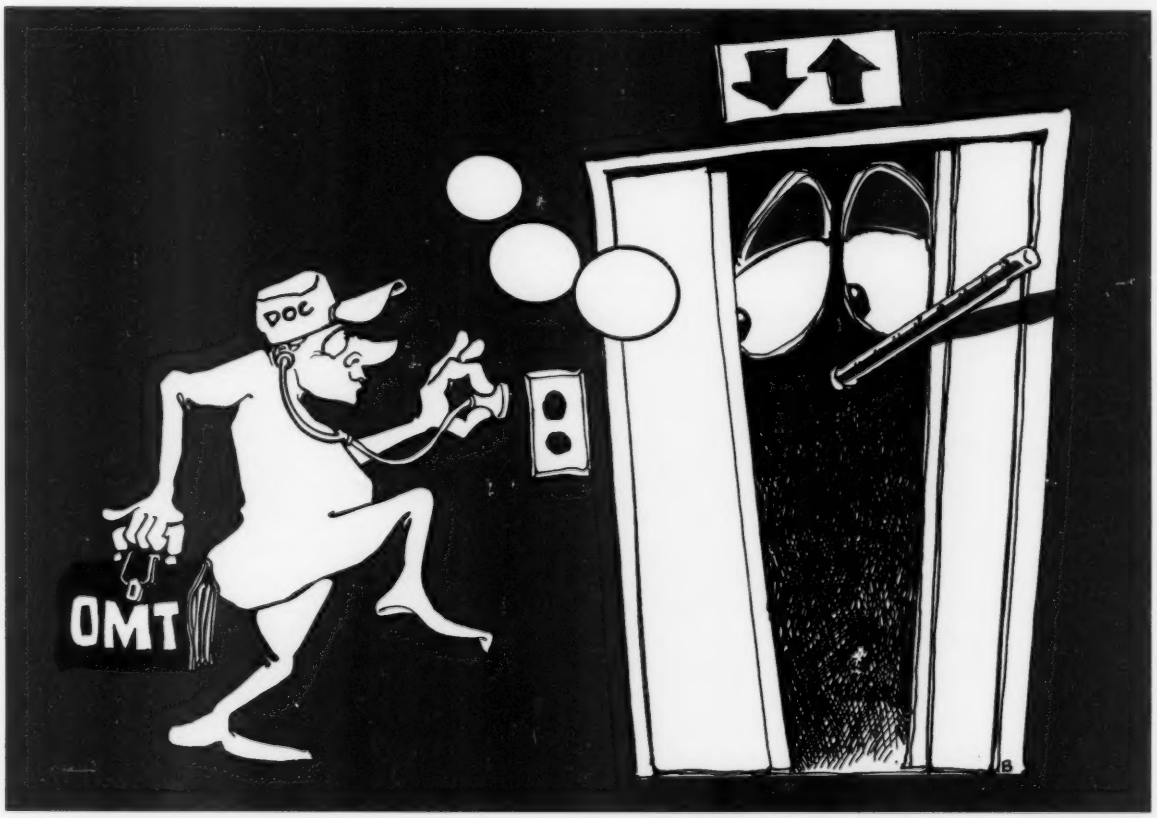
From the mid-1970s on, however, the rate of change has been revolutionary, and many a veteran elevator mechanic has been overwhelmed and out of a job due to the rapid advance of new technology within the elevator industry.

During this period of rapid change, the industry designated nothing as a sacred cow. Everything was subject to change. The very basic "T" shape of the venerable 100-year-old guiderail was changed for some applications. One company produced and installed a round guiderail, while another produced a guide shaped like the Greek letter omega. Even a counterweight chink, a simple lump of pig iron used for incremental filling of a counterweight frame for elevator balance, wasn't exempt from change.

The traditional, finger-smashing, virtually immovable, 4-inch slabs were replaced with easy-to-handle 1-inch plates. One company actually pours its counterweight frames with concrete.

The two basic elevator power supplies of AC and motor-generator supplied DC have suddenly expanded to silicon-controlled rectifiers (SCR drives), variable frequency AC, and even a pure battery source, where there is no power source from the building. A linear induction motor elevator drive was patented by Otis in France. This new departure in elevator propulsion will use the counterweight as the moving part of the hoist motor and fixed conductors in the hoistway as the remaining motor parts. This concept eliminates the need for an elevator hoisting machine located in the building.

Transmission means expanded from basic traction and direct hydraulic to holeless hydraulics, telescopic hydraulics and even back to the once-used roped hydraulic. Double-decker elevator cabs are the rule rather than the exception today in New York and Chicago skyscrapers and triple-decker cabs are planned for tomorrow in Japan's Takenaka Corporation's "Sky City."



Art by Bill Brack

The brains of the outfit

But nowhere has the new age made more inroads than in the area of the elevator's controller, the "brains" of an elevator system. Otis' top control system is ELEVONIC 411; Armor has TMS9OO; Shindler, the EPOCH; and Dover, the TRAFLOWMATIC III. Computerized Elevator Corporation has named its controller SWIFT (Shorter Waiting Intervals and Faster Trips).

Modern elevators

One of the first places the differences between conventional and modern elevators would be noticed is in the sound. Conventional elevator machine rooms in a building can often be located just by walking toward the "clickety-clack" of the hundreds of relays pulling in and dropping out. The sound level of a modern elevator machine room rivals the average domestic living room when the kids are in school.

Probably the next place changes would be apparent is in the size of the equipment. For example, the three relay logic controllers installed for the tower elevators at the National Naval Medical Center in Bethesda, Md., are 10 feet in height, 15 feet in width.

When coupled with the three selectors that tower 8 feet into the air and the three motor-generator sets, the elevator equipment exceeds 600 cubic feet of machine room space, not counting the hoist machines. Montgomery Elevator Company's new equipment is capable of doing a better and quieter job and consuming less power while occupying one-fifth the space of the previous equipment.

The settings and adjustments are easily and quickly made on today's microprocessor controllers. The length of time the car door stays open on a new Otis elevator, for example, is the product of dip switch manipulation feeding a code into the microprocessor.

For previous generations of Otis elevators, this time was determined by the discharge of a condenser through an adjustable resistor. At one time, the desired time would be set by adjusting the dropout of a relay by a mechanically operated pneumatic plunger pulling air through an orifice and a small reed-like object called a flutter valve.

From the mid-1970s on, however, the rate of change has been revolutionary, and many a veteran elevator mechanic has been overwhelmed and out of a job due to the rapid advance of new technology within the elevator industry.

When things go wrong

When there is a problem with today's high tech Otis elevators, the technician who arrives probably will be carrying an attache case called an OMT (Otis Maintenance Terminal). By means of this proprietary diagnostic tool, the technician can plug directly into the processor and, through several digital readouts, accurately diagnose the problem. While at it, he can see if the present problem had caused any previous trouble.

For some of the really tough field problems, other companies actually connect the troublesome controller to their main offices or factories by means of their diagnostic tools. Sometimes an office or factory is thousands of miles away from the malfunctioning elevator. In these cases, the trouble is transferred to a test controller and the diagnosis and correction made at the remote location.

However, elevators are designed so only the company's technicians can provide the maintenance and repairs. For example, the original Otis OMT was equipped with a switch and its own separate power supply, designed to destroy the tool's internal chips and render it useless if anyone attempted to open the device.

To keep its elevators running, the Navy must be able to match the elevator maintenance contract to the elevator equipment. Manufacturer's maintenance is standard practice in the private sector. The Navy cannot specify the company that will maintain and service its equipment, once the new installation has been turned over to the Navy. The challenge to the Navy, therefore, is to make sure the new elevators do not require proprietary diagnostic tools to service the equipment.

The Navy must continue to edit our specifications so that new elevators are equipped with relay logic controls on one of the few generic microprocessors that are available on the open market. On a positive note, as more and more elevator manufacturers discontinue the use of relay logic controls, more and better microprocessor controls are being developed by small manufacturers for the open market. ❑

OMSI: A Tool for Providing Technical Information to Operate and Maintain New Facilities

By Paul C. DaVia, P.E.

Naval activity personnel and their maintenance organizations need clear, comprehensive data to operate, maintain and repair facilities properly. A Naval Facilities Engineering Command initiative—Operation and Maintenance Support Information (OMSI)—provides the tool needed to make sure a new facility looks and performs well over its entire life cycle at a minimum cost.

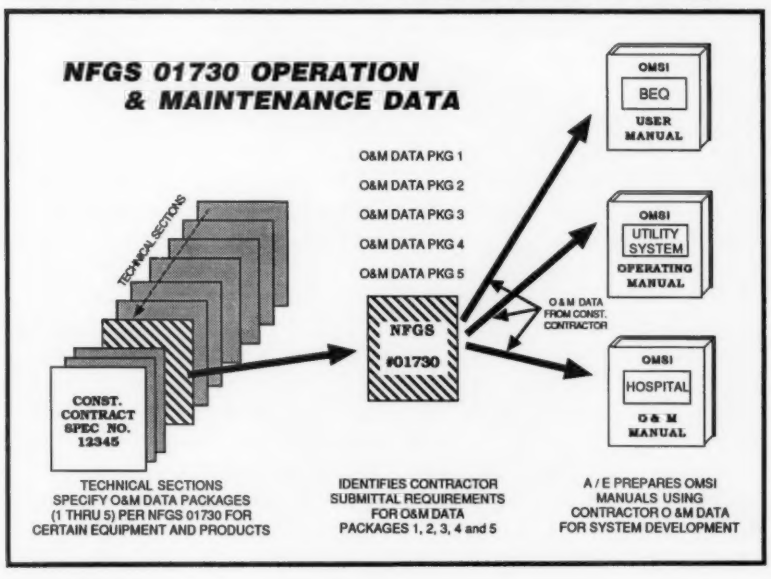
Your new administration building

You are the public works officer and a new administration building has been turned over to you to operate and maintain. This sounds simple enough, except that this building's heating, ventilation and air conditioning system is a variable air volume (VAV) type with air-side economizer, multi-loop direct digital control, central energy monitoring and intrusion detection systems.

The building also has extensive fire protection consisting of a preaction sprinkler system, smoke detectors, multi-zone alarms and an underfloor fixed fire suppression system for electronic areas.

In this "simple" administration building, there is so much you need to know: How many VAV boxes? Where are they? What are the control set points? How do the fire protection elements operate as a system? What equipment has extended warranties? What preventive maintenance is required? Are spare parts, special tools or special training needed? This information is critical whether operation and maintenance (O&M) will be handled in-house or under a facility service contract.

The A-E preparing the OMSI manuals uses this data to develop comprehensive OMSI coverage of a system based on as-built products used in the facility.


NFGS 01730 OPERATION & MAINTENANCE DATA
O&M DATA PKG 1
O&M DATA PKG 2
O&M DATA PKG 3
O&M DATA PKG 4
O&M DATA PKG 5
TECHNICAL SECTIONS
CONST. CONTRACT SPEC NO. 12345
NFGS #01730
O & M DATA FROM CONST. CONTRACTOR
OMSI BEQ USER MANUAL
OMSI UTILITY SYSTEM OPERATING MANUAL
OMSI HOSPITAL O & M MANUAL
TECHNICAL SECTIONS SPECIFY O&M DATA PACKAGES (1 THRU 5) PER NFGS 01730 FOR CERTAIN EQUIPMENT AND PRODUCTS
IDENTIFIES CONTRACTOR SUBMITTAL REQUIREMENTS FOR O&M DATA PACKAGES 1, 2, 3, 4 and 5
A / E PREPARES OMSI MANUALS USING CONTRACTOR O &M DATA FOR SYSTEM DEVELOPMENT

What do you do?

After the resident officer in charge of construction turnover ceremony, you are in charge of the building. What do you do?

The first thing you might think of are the boxes of contractor submittals given to the resident officer in charge of construction. More than 700 submittals are made for the average project, so finding specific information might be difficult to do.

Typically, the boxes of submittals were passed around to maintenance control, engineering and the public works shops, where people pulled out information that looked interesting for their own private libraries. Submittals remaining in the boxes were thrown out. Often, within two weeks,

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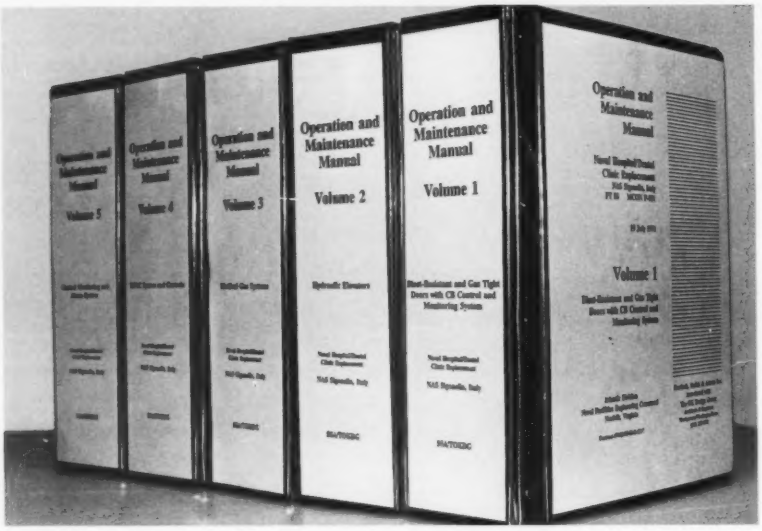
Paul C. DaVia manages the OMSI program at the Atlantic Division, Naval Facilities Engineering Command in Norfolk, Va.

This instead of ...



OMSI manuals for the Hospital/Dental Clinic at Naval Air Station Sigonella, Italy. (Photo by Jim Meehan)

almost all product and O&M data on the facility was dispersed and essentially lost. So, O&M of your new administration building becomes a technical nightmare.

Dissatisfied users

In the past, the few O&M manuals called for in the specifications were often for *components* rather than systems. The quality and usefulness of the manuals were marginal at best. Problems relating to the lack of information at facility turn-over included:

- Designs did not fully consider O&M requirements
- Poor preventive maintenance
- Repairs were slow, difficult and costly
- Warranties not enforced/maintained
- Mission impact when critical systems failed

It was out of this context that OMSI was born and formalized by NAVFACINST 11013.39A (July 6,1990). OMSI is actually a lofty acronym for what are really manuals. O&M manuals aren't a new idea, so how is OMSI different?

- **Prepared by design professionals.** In the past, O&M manuals were usually prepared by the construction contractor who relied on his subcontractors or suppliers to provide information on the system components. The quality of the contractor submitted manuals on a total system basis was often very poor because the contractor had not done the design. The designer, on the other hand, knows how the system was intended to operate but is also required to review all contractor submittals such as shop drawings, product data, O&M data and test results.

The A-E of record is in the best position to compile comprehensive O&M manuals covering as-built products and selected systems. The Atlantic Division, Naval Facilities Engineering Command in Norfolk, Va., found that even A-Es who have never prepared O&M manuals are able to quickly develop the ability to produce a quality product.

- **Prepared during construction.** An O&M manual is usually needed at some point before construction completion. The pre-final OMSI manual is provided 60 days before the beneficial occupancy date. This manual is a "working" document prepared by the A-E and is used to begin the operation and maintenance functions.

- **Standardized format.** Although OMSI must be tailored to specific projects, the basic format and content of the manuals are derived from generic scopes of work. In this way, whether it's a project at Naval Air Station Norfolk, Va., or Naval Air Station Sigonella, Italy, the user and the maintenance organization will know what information to expect and how to find it in the manuals.

- **Comprehensive coverage.** OMSI manuals include only useful information on all products and selected systems. The manuals are user friendly. The manuals generally include all product data, relevant shop drawings, test reports, O&M data, manufacturer's data, parts lists, warranties and other key submittals. Not generally included are items such as certifications, transmittal sheets, disapprovals and non-relevant pages in the product data sheets.

The objective is that someone needing *any* as-built information on a facility will be able to find it quickly, whether it's a special light fixture, ceramic wall tile or a complex HVAC control system. Facilities can then be maintained (and kept looking good) because the public works department will have the information about where to purchase spare parts.

The expensive alternative to main-

tenance is replacement. Ceiling tiles, paint, door hardware, carpet and wallpaper are examples of architectural features where original product information, such as the information provided in OMSI manuals, can save thousands of dollars and keep your facilities looking sharp.

• **Operation and maintenance data.** NAVFAC Guide Specification 01730, Operation and Maintenance Data, is the key to successful A-E preparation of an excellent quality OMSI product. NFGS 01730 requires the construction contractor to furnish O&M data for certain products, equipment and systems.

This data is reviewed for completeness by the designer as part of the shop drawing/submittal review phase, which is exercised after construction award.

The A-E preparing the OMSI manuals (normally the designer) uses this data to develop comprehensive OMSI coverage of a system based on the as-built products used in the facility.

OMSI elements

The principle OMSI elements which may be included in the manuals are:

- Design concept data and basis of design
- Basic data needed for preparation of facilities support contracts and performance work statements
- Operating procedures for start-up and shutdown, and emergency and safety instructions
- Operation and maintenance technical data and as-built product documentation
- Maintenance requirements, test equipment and special tools
- Preventive maintenance requirements and schedules
- Troubleshooting guide, diagnostic techniques and repair procedures
- Supply support (such as repair and spare parts, fuels and lubricant)
- Environmental considerations
- Training plan, staffing requirements and personnel qualifications

Types of OMSI

OMSI is valuable to an activity for most projects because it preserves and organizes information on the thousands of specific products and components used in construction of the facility.

OMSI is particularly needed on projects having complex built-in systems for which submittal of operating or operation and maintenance data is called for in the construction specifications.

The degree of OMSI will vary with the kind of facility and complexity of systems in the facility. Projects requiring OMSI can be classified as Type A, Type B, Type C or Type D. Examples of those types and the manuals they need are:

Type A: Laboratory, hospital, industrial waste treatment plant and power/heating plants

Need: Operation and Maintenance Manual plus User Manual

Type B: Operation and training facilities, bulk liquid fuel storage and utility systems

Need: Operation Manual plus User Manual

Type C: Warehouse , BEQ/BOQ and recreation facilities

Need: User Manual

Type D: Paving, dredging and open storage

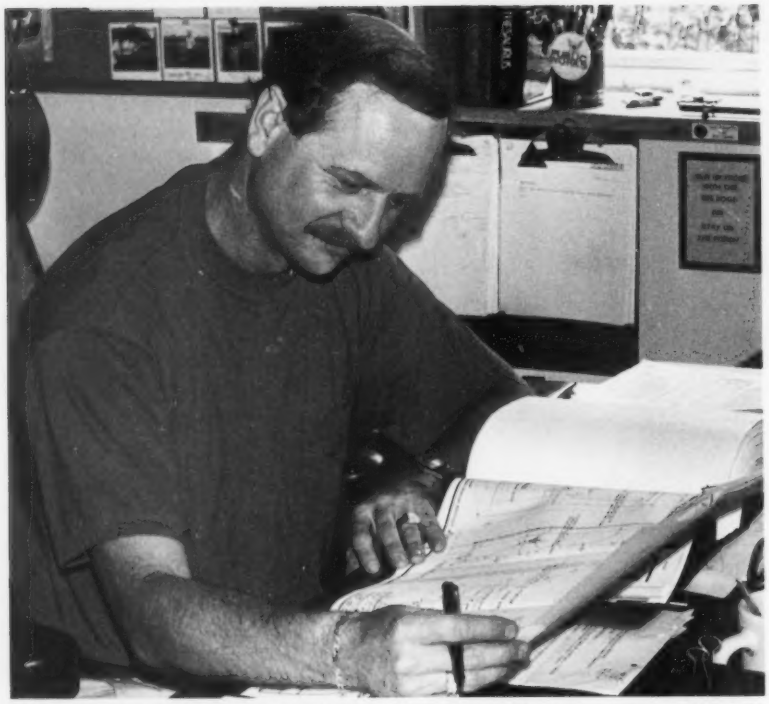
Need: As-built drawings only

OMSI manuals

• **User Manual.** This manual compiles and indexes all contract

...this.

Contractor submittals as they are typically provided to an activity. The average military construction project has more than 700 submittals consisting of shop drawings, product and O&M data and test reports. (Photo by W.W. Harper)



Tony Curnutte, maintenance control director at Naval Air Station Oceana, Virginia Beach, Va., reviews OMSI User Manual for the Avionics Maintenance Training Building. (Photo by Jim Meehan)

submitted as-built product information and operation and maintenance data into bound volumes. Only relevant pages are included. For example, transmittal sheets and certifications are removed and only key shop drawings are included. The manual also provides information such as quantity take-offs needed for performance work statement preparation, special warranty data and simplified plans showing utility shutoff locations.

Because about 60 percent of all projects will require only a User Manual, this manual also provides basic operation, maintenance and repair information on the most troublesome systems: HVAC, fire protection and roofing.

• **Operating Manual.** This manual may be appropriate for new facilities having complex systems which require only special operating information such as procedures for start-up and shut-down, emergency operation, flow diagrams, control setpoints and calibration requirements. An Operating Manual will *not* provide information on maintenance, trouble-shooting and repair.

• **Operation and Maintenance Manual.** This manual is used for facilities having complex systems which require operation, maintenance and repair information. This manual also covers maintenance and preventive maintenance requirements and schedules, trouble-shooting and repair guides, diagnostic techniques and repair procedures.

OMSI Cost/benefits

The cost of OMSI is modest—from 0.25 percent to about 2 percent of the construction cost, depending on the size and complexity of the project. Maintenance costs over the life of a facility often exceed the initial construction cost, so even a small increase in the maintenance efficiency and effectiveness can quickly return the cost of OMSI manuals.

What benefits can you expect from comprehensive OMSI Manuals?

- Improved design, specifications and contractor data submittals
- Faster facility turnover and acceptance
- An indexed compilation of all as-built product data
- Operation, maintenance and repair data for complex systems
- Preventive maintenance details and schedules
- Specific information on products covered under extended warranties
- Data for quicker preparation of facility service contract and performance work statement scopes
- Faster repair response—both routine and emergency
- Reduced downtime/improved mission readiness
- Future alterations that fit rather than damage the original design concepts
- Improved professional image of maintenance organization
- Satisfied customers

OMSI feedback

At LANTDIV, more than 50 OMSI manuals have been completed, with another 200 underway or programmed. Response to the OMSI program from our customers has been very positive.

"Focus on the customer's needs," "improve the system" and "deliver a quality product" are important concepts of Total Quality Leadership. OMSI is an excellent example of the thrust of TQL, by providing the final step in the facilities acquisition process: the technical information you need to operate, maintain and repair new facilities efficiently. ❑

Seabees to the Rescue: The Mount Pinatubo Disaster Recovery Efforts

The Fall 1991/Winter 1992 *Navy Civil Engineer* described the first three days following Mount Pinatubo's June 1991 eruption. The following articles briefly recount Seabee participation in what became one of the largest disaster recovery operations in 50 years of Seabee history—Operation Fiery Vigil.

• • •

The Seabees' First Responses to the Disaster

By LCDR George Eichert, CEC, USN

The eruption of Mount Pinatubo was characterized by volcanologists as one of the most violent of the century. More than one-half billion cubic yards of sandy ash spewed from the mountain and blanketed the countryside, including the Subic/Cubi naval complex, with a 6- to 10-inch layer of ash.

The debris from this enormous eruption, in concert with hundreds of tremors and Typhoon Diding, caused the loss of utilities, rendered roads impassable and crushed more than 160 buildings on the United States' facility.

A 90-man detail from Naval Mobile Construction Battalion Three, already deployed to Subic Bay, and 45 men from Construction Battalion Maintenance Unit 302, homeported at Subic Bay, immediately started shoring and evacuating buildings, clearing roads for emergency vehicles and restoring utilities even as the ash fell.

As damages were assessed, essential utilities restored, and transportation arteries opened, plans were formulated by the Public Works Center Subic Bay staff to quickly return the naval facility to full operations. Almost 400 Seabees from Naval Mobile Construction Battalion Four were immediately mobilized and diverted from Okinawa, and another 100 NMCB Three Seabees in Guam augmented their detail. All Seabees were placed under the command of the Commander, Construction Battalions, Pacific, Representative Philippines.

Essential operations were restored by Seabees who worked around-the-clock for 42 consecutive days. In total, more than 50 structures were safely demolished, 280,000 tons of ash removed, 900,000 square yards of airfield paving and 75 miles of road cleared, 35 miles of overhead electrical power distribution lines restored, 750 air conditioning and refrigeration units cleaned and restored, and 25 replacement buildings erected. *All in 100 days.*

The Seabee effort was instrumental in the rapid recovery of the United States naval facility in Subic Bay. Although these articles focus on the Seabee disaster recovery effort, other organizations such as the public works center, officer in charge of construction and Marines also played vital roles.

It was teamwork, close coordination and common goals that led to Subic Bay's rapid restoration. ❑

Seabees use dozers to pile up ash around the Subic Bay naval complex. (Photo by PH1 Thom Lindgren)

LCDR George Eichert is currently NMCB Three's operations officer. He served as the NMCB Three detail officer in charge during Operation Fiery Vigil.

Ash Removal: Clearing the Way for the Return to Normal Operations

By LCDR (Sel.) Barry Loveless, CEC, USN
and
LT John Heinzel, CEC, USN

Typhoon Diding's strong winds caused ash drifts as if the area had been hit by a snow blizzard. However, unlike snow removal, help from the sun and balmy weather could not be expected. The ash wasn't going to melt. The main roads were initially plowed for emergency vehicle access and the evacuation of dependents. Seabee graders opened the airfield to C130s by pushing the ash to the side.

Then the Seabees, public works center personnel and Marines, with their construction and clearing equipment, began the long-term recovery effort by dividing the complex into three sectors. The Seabees were tasked with the Naval Air Station Cubi Point, the Naval Magazine and the Naval Hospital. (Naval Mobile Construction Battalion Three was tasked with the airfield. Naval Mobile Construction Battalion Four was tasked with the roads, parking lots and other paved areas.) The Marines were tasked with the Naval Supply Depot, and the PWC concentrated on the Naval Station and housing.

NMCB Three's initial effort on the airfield was limited to three roadgraders plowing the ash off the runway to the infield. Six days after the eruption, C130s were again flying into NAS Cubi Point, allowing vital supplies, equipment and additional manpower to arrive. The cargo ship *American Condor*, which had been carrying Desert Storm Seabee equipment to Port Hueneme, Calif., for retrograde, was immediately diverted to the Philippines and brought needed earthmoving equipment.

Seabees quickly discovered that using graders and scrapers in unison was highly effective. The graders would clear an area by pushing the ash into a berm and then the 15 CY scrapers would haul off the berm to the designated airfield dump area. At the dump, D7 dozers moved the ash.

Seabees applied all available earthmoving equipment to remove ash quickly and restore normal operations to the naval complex.

On July 10, after working around-the-clock, 9,000 feet of runway had been cleared so C-141 operations could resume. Wide wingspan aircraft, such as the C-5, were able to resume operations by July 26.

With full runway operations restored, Seabees continued ash removal on taxiways, parking aprons, weapons handling and other airfield areas. Front-end loaders, Bobcats, laborers with shovels and dump trucks handled the tedious ash removal. By

A Seabee from NMCB Four removes ash from NAS Cubi Point as part of the cleanup efforts. (Photo by PH1 Thom Lindgren)

LCDR (Sel.) Barry Loveless is currently NMCB Four's training officer. He served as NMCB Four's Alfa Company commander and equipment officer during Operation Fiery Vigil. LT John Heinzel is currently NMCB Three's Detail Souda Bay officer in charge. He served as NMCB Three Alfa Company commander and equipment officer during Operation Fiery Vigil.

September, the last cubic yard of ash had been removed.

NMCB Four removed the ash from roads, parking lots, and other paved areas at NAS Cubi Point, the Naval Magazine, and the Naval Hospital. The standard operating procedure was to open the roads for traffic using roadgraders, then remove the ash piles using front-end loaders and dump trucks.

Tenant commands, local hires and contract laborers used shovels and wheelbarrows to remove ash from roof tops, around buildings, sidewalks, landscaped areas and other places equipment could not reach. Small Bobcat loaders, operated by station personnel, moved the ash to accessible places so the Seabees could dispose of it with front-end loaders and dump trucks. It was an efficient arrangement, as Seabee equipment was able to work to capacity on large piles of ash in the streets, and it limited damage to nonpaved areas by heavy equipment.

Through the Naval Magazine's 40 miles of narrow, winding roads, graders first plowed the ash to one side of the road. Because of the hilly terrain, the graders could frequently blade the ash over the road's shoulder and avoid having to haul it away. By July 26, all magazine areas were accessible.

Mechanics worked around-the-clock, and storekeepers expedited spare parts to keep the tired equipment working despite ash-clogged filters and an assortment of mechanical breakdowns.

Seabees applied all available earthmoving equipment to remove ash quickly and restore normal operations to the naval complex. PWC, through the officer in charge of construction office, contracted for dozens of dump trucks that operated in conjunction with PWC and Seabee grader and loader operators. Three months after the eruption, all paved areas had been cleared. ❑

BU3 Joel Wilson of NMCB Three's Charlie Company demolishes the sheet metal of a collapsed building. (Photo by EA2 Edison Carlos)

The Seabees' Next Task: Building Demolition

By LT Mark Terrill, CEC, USN

The 6 to 10 inches of ash and accompanying rainfall combined to load the Subic Bay complex building roofs similar to that of a heavy snow. More than 160 temporary and semi-permanent Philippine structures, not designed for such a vertical load, collapsed.

Low pitched roofs, pre-engineered metal buildings and tension membrane structures accounted for most casualties.

By mid-July, utilities had been restored and decisions made regarding what facilities were to be replaced and where. Building demolitions were assigned to either the Naval Construction Force or public works center crews.

In total, Naval Mobile Construction Battalions Three and Four demolished 51 steel, wood and concrete buildings including aircraft hangars, shops, supply warehouses and ordnance storage facilities.

Because demolition is inherently dangerous, a principal concern was personnel safety. Most buildings were partially standing with power tie-ins still energized. Eight facilities at the Naval Magazine contained ordnance. These factors, in addition to the heavy monsoon rains and the 12-hour workdays, increased the likelihood of a

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LT Mark Terrill is currently NMCB Four's assistant operations officer and air detail officer in charge. He served as NMCB Four Charlie Company commander during Operation Fiery Vigil and as their Subic Bay Detail officer in charge when the battalion mainbody returned to Okinawa.

serious accident.

To offset these potential hazards, demolition plans were developed by crew leaders and reviewed by the safety officer. Additionally, power was always completely secured and disconnected at each site. Daily safety lectures were given. At every demolition site with ordnance, the Naval Magazine provided a dedicated safety inspector.

Through a high emphasis on safety, and the diligence of project supervisors and project safety petty officers, no major mishaps occurred and minor first aid injuries were minimal.

A typical demolition crew consisted of eight to 12 men from the builder, steelworker, utilitiesman and construction electrician ratings. They were equipped with gas cutting rigs, forklifts, dump trucks, and front end loaders or cranes, as needed. During peak demolition operations, the NCF had nine demolition projects in progress concurrently.

Because the facilities technically are owned by the Philippine government, demolition could not be carried out indiscriminately. For instance, clamshell buckets were not permitted since they would render metal siding unsalvageable.

Building members were cut up in sections and transported to specially designated metal dumps where Filipinos had first choice of any material. It was common to see women carrying metal siding pieces on their heads walking toward the gate. These pieces would then be used to remodel their home or perhaps build a new one.

As the NCF accomplished their mission, they also benefited by cross-rate training their men. Many Seabees acquired building demolition and gas cutting skills and gathered experience driving forklifts, dumps and loaders. In addition, they got to push themselves hard and succeed under difficult conditions. ❑

SW2 Ronald Kaario uses a cutting torch to remove siding from a destroyed building during demolition operations. (Photo by PH1 Thom Lindgren)

Rebuilding: K-span Structures Used for Rapid Construction

By LCDR Thomas Destafney, CEC, USN

The majority of the failed structures were used for either storage or industrial shops. Because these buildings were critical to the United States' facility's mission, rapid replacement was imperative. Once existing structures were demolished, the goal was to erect expeditionary buildings quickly so normal operations could resume and material could be protected from the monsoon rains.

The primary expeditionary building type selected, based upon availability and ease of construction, was the K-span building that was so highly successful during Operation Desert Shield/Storm. K-span buildings provided the easiest, least expensive and quickest storage and shop facilities under the circumstances. Since they can be erected on existing pavement or on new foundations, existing slabs were frequently used after the collapsed building was demolished. By the middle of July, more than 60 sites were selected, material ordered and construction started. Naval Mobile Construction Battalion Five quickly flew in four experienced Seabees who had erected K-spans in Saudi Arabia to help train crews from Naval Mobile Construction Battalions Three and Four.

K-span building construction is straightforward. Material for constructing these Quonset hut-like struc-

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LCDR Thomas Destafney is currently NMCB Four's operations officer. He served as the Commander, Construction Battalions, Pacific, Representative Philippines operations officer during Operation Fiery Vigil.

tures is provided in 4,000 pound rolls of galvanized steel with a baked enamel paint finish on one side. The rolled sheet steel is fed through an extruding machine twice to make a 12-inch wide arch of any desired radius. Once the arches are formed by the extruding machine, three to five 12-inch pieces are joined together, side by side, to form a 3- to 5-foot wide arch. Another machine, the seamer, then joins the arches by crimping the edges together.

A crane hoists the arches one at a time to be seamed to an adjacent arch to form the building. A Seabee literally rides the seaming machine up and over the building to seam adjacent arches. Strict safety procedures are followed to prevent the Seabee from accidently falling.

Each arch is tack-welded to a horizontal piece of angle iron that is bolted to the foundation. After every arch is erected and seamed, a concrete footer is placed to anchor the building to the foundation. If end walls are needed, the coiled metal is run through the extruding machine once and a similar seaming procedure is followed to erect the walls. Doors, windows, lights and plumbing may be added to complete the structure. Because the arches are seamed together on the deck and lifted into place independently, any number can be joined together to make a building of any length. Typically, buildings were 100- to 150-feet long. The range of building widths possible is 40 to 72 feet, with heights up to 26 feet.

Benefits of K-span structures include low manpower requirements, minimal planning and estimating, standard design and low cost. An average K-span (50 feet by 100 feet) on an existing slab took about 200 mandays to complete, as compared to more than 600 mandays for a comparable pre-engineered metal building. The cost benefits are also significant. A comparable PEB would cost at least 1.2 times the money to buy. But most important is the time saved. A 15-man crew, working independently, can erect a K-span building in about two weeks. By creating a production line system with independent layout, fabricating, rebar, erection and forming crews, two or more basic buildings can be completed each week. The K-span expeditionary building has proven to be another useful tool in the Seabee's bag of tricks. ❑

A front loader is used to clear the runway at NAS Cubi Point. (Photo by EA2 Edison Carlos)

Bainbridge...
Continued from page 4

tionship with MDE because tank removal was MDE's preferred method for UST closures at this site. On-site landfarming and asphalt batching of the contaminated soils resulted in significant cost savings in comparison to traditional off-site disposal techniques, and minimizes future Navy environmental liability associated with transporting and disposing of contaminated soils off-site. The tanks and piping were salvaged and disposed of at a local junk yard by the contractor.

The salvaging and the reclamation of the material recovered from the tanks proved to be a cost effective and environmentally sound method of handling material generated by the closure of the USTs.

Remedial investigation and feasibility study projects at the old landfill and firefighting training area are expected to be completed by July 1992. These studies will generate remediation options for the sites. The Navy will then select and implement a remediation program for each site after consultation with state and local regulators and the local residents. Asbestos removal and the demolition of more than 400 buildings are also ongoing, with completion scheduled for the summer of 1993.

The Navy is negotiating with the Maryland Economic Development Corporation (MEDCO) to execute a lease/purchase agreement. When the agreement is executed, the state will be able to immediately occupy the site to begin soil borings, surveys and marketing efforts.

The state hopes to redevelop Bainbridge with a mixed used project consisting of residential, commercial and recreational uses. Building demolition and asbestos removal are expected to be completed by June 1993, at which time title to the property would pass to the state. ❑

SECNAV Praises NAVFAC-CEC-Seabee Family at the 1992 Anniversary Ball

The Honorable H. Lawrence Garrett III, Secretary of the Navy, was the guest speaker at the 1992 Anniversary Ball.

The Honorable H. Lawrence Garrett III, Secretary of the Navy, was the guest speaker at the 1992 Anniversary Ball celebrating the 150th birthday of the Naval Facilities Engineering Command, the 125th birthday of the Navy Civil Engineer Corps and the 50th birthday of the Seabees. The ball was held on March 7 in Washington, D.C. Here are the Secretary's remarks, in part:

It has been my observation, over the years, that engineers in the Navy exert a special kind of mystique. On board ships, the chief engineer is deferentially considered—even by the skipper—as something of an oracle...a magician who does strange, wonderful and unseen things to keep the engines turning and the showers hot.

It's not much different for the Navy as a whole; during all of my five years in the Secretariat it has been a mystery to me how *you*—of the naval facilities engineering community—manage without fail to keep our bases running, our infrastructure repaired, and our public works actually *working*.

I doubt very much that Captain Lewis Warrington—in 1842 the first chief of the Bureau of Yards and Docks—ever imagined that NAVFAC, as it has come to be known, would someday be responsible for over 22,000 people on installations all over the world doing business worth 6 billion dollars every year. He had never even *heard* of a Civil Engineer Corps—which wasn't created until 1867...and then with a total of only 10 officers.

Captain Warrington was responsible for—among other things—"all vessels in ordinary; all carts or other vehicles; all horses and oxen used in the yards."

Admiral Bottorff, today, doesn't have to worry much about horses and oxen—but he and his people *do* have to worry about maintaining the most sophisticated naval facilities anywhere in the world...and they've consistently done a matchless job.

The 10 officers of Captain Warrington's day now number over 1,500 active and 860 reserves. Whether leading civilians or sailors...whether managing environmental problems or directing Seabees in a combat zone...their professionalism, skill, ingenuity, and dedication are simply extraordinary.

Today, it's virtually impossible to imagine a fleet without its corps of dedicated and professional engineers—both military and civilian.

But it's even more impossible to imagine the fleet without its Naval Construction Battalions—the "Can Do" Seabees.

The Seabees were created 50 years ago—in January of 1942—by Admiral Moreell of the CEC; and by the end of that year they had already become a legend.

The men who enlisted in the Seabees in World War II were the best craftsmen, artisans, and engineers in America's construction industry. They tore up their draft deferments, turned down high-paying civilian jobs, and joined the Navy by the thousands...joined to build the roads to victory in the Pacific, in Europe—on almost every continent and ocean in the world.

"We build, we fight," is the Seabee motto—and on steaming islands like Bougainville and Guadalcanal and Iwo Jima, the distinction between building and fighting was a fine one. The Seabees were known for getting on with the job, without much regard for whether the front lines were able to keep up with them or not.

There are a thousand stories; just pick one—like the one about Machinist Mate First Class Aurelio Tassone who used his bulldozer to destroy the blazing guns of an enemy pillbox on Bougainville—because it got in the way of a road that had to be built.

During the brutal island-to-island fight in the South Pacific, the United States Marines—who are not known for being easily impressed with anyone—composed a bit of doggerel that spoke volumes. It went like this:

So when we reach the Isle of Japan
With our caps at a jaunty tilt,
We'll enter the city of Tokyo
On roads the Seabees built.

But the legend wasn't just made in the Pacific. The first U.S. vehicle to land in Europe during World War II was a bulldozer driven by a Seabee, assigned to a British Hampshire Regiment at Salerno, Italy.

In France—where the Seabees went ashore on D-Day and built harbors under the German guns—there may still live the woman named "Seabee Fouchard," named in honor of the 81st Seabee Battalion doctor who delivered her at birth.

And all that was just the beginning.

In Korea, in Vietnam, in almost every corner of the world where the nation has been called to meet a crisis the Seabees have been there, too—*building* what they needed to build, *fighting* when they needed to fight.

Today, of course, we no longer simply recruit America's finest engineers, craftsmen, and artisans...we *create* them. We teach young men—*and* women—the skills that not only help win wars but also build nations. And those new Seabees are way too busy creating legends to have any time for resting on the old ones.

Today, it's virtually impossible to imagine a fleet without its corps of dedicated and professional engineers—both military and civilian.

When I visited the Persian Gulf during Operation Desert Shield I saw personally the tons of materiel that the amphibious construction battalions unloaded during the first days of the operation...I saw the cities, the hospitals, and the airfields that Seabee men and women had raised up out of the sand...and to this day I hear Marine commanders—among many others who served in Southwest Asia—speak of the Seabees in terms of stirring respect and affection.

And it was by no means only the active duty Seabees that earned all the accolades. Our *reservists* proved themselves beyond any question as well—both in Southwest Asia itself and in places all over the world where construction support was vitally needed. in fact, our NMCBs with the letter "R" in front proved to be such an integral, immediate responsive component of our overall Seabee capability that it just didn't seem to make any sense to keep the "R" anymore. Since June of 1991 the reserves have been simply "Naval Mobile Construction Battalions" like any others.

As many of you are probably aware, the CNO recently forwarded to me a proposal for a Seabee Combat Warfare designation, to reflect the fact—and I quote—that a "qualified Seabee is in the truest sense a warfare specialist, just as his submarine, surface, or air warfare counterparts."

I think you should know that the proposal received glowing endorsements all the way up the chain of command—and I can think of no more appropriate occasion than this to announce that I have enthusiastically approved it...and I look forward to seeing our qualified Seabees wearing their new insignia just as soon as it's available.

NAVFAC, the CEC, and the Seabees have a lot to celebrate this year...and a lot of history to be proud of. But I doubt that any of us, here, is not aware of the unprecedented challenges facing this nation, its naval forces, and certainly our civil engineering community as we look out into the future.

The irony, of course, is that we face these *new* challenges precisely because we have done so well in meeting yesterday's. We won the Cold War largely because men and women like you—both military and civilian—were determined to keep this country strong, capable, and ready to defeat any military threat to our way of life and to our values. The theories of Marx and Lenin finally surrendered to our will and our power to resist them.

No one seriously imagines that the world has become a safe place just because communism is bankrupt; but at the same time, no one responsibly thinks that we need a *Cold War* military machine to keep ourselves safe in it. It is the responsibility of all of us who are part of the military to aggressively re-size and re-structure ourselves—with the object of providing America with the defense it needs at a cost that makes sense.

That's easily *said*...it is not nearly so easily done. I know that all of you, here, are experiencing many of the painful and frustrating stresses and strains that come with downsizing and reorganizing—strains that are made even

Continued on page 32

33 Complete Basic Training at CECOS

Thirty-three members of basic class number 196 have graduated from the Naval School, Civil Engineer Corps Officers, Port Hueneme, Calif. Course work is comprised of eight weeks of specialized training pertinent to the Navy's needs for shore installation engineering, public works management, construction contracting and administration, and Seabee operations.

ENS Jorge L. Alvarado
BSME/Univ. of Puerto Rico
to OICC Far East Cont. Off.,
Iwakuni, Japan

ENS James J. Boudo
BSCE/Univ. of Mass.
to NMCB One,
Gulfport, Miss.

LT Harold A. Boulka*
BSEE/Villanova Univ.
to SUBTRAFAC, Norfolk, Va.

ENS Michael A. Conley
BSCE/Univ. of Kentucky
to NAS, Atlanta,
Marietta, Ga.

LT Darryl K. Cressy‡
BSME/Univ. of Tennessee
to CBC Port Hueneme, Calif.

ENS Daniel L. Diederich*
BSIE, Northwestern Univ.
to SOUTHDIV Cont. Off.,
Parris Island, S.C.

ENS Eric K. Dobyne
BSEE/Univ. of Michigan
to LANTDIV Cont. Off.,
Guantanamo Bay, Cuba

ENS Franklin T. Duvall Jr.
BSME/Tennessee Tech
to NAS Fallon, Nev.

ENS Dennis E. Edwards*
to SOUTHDIV Cont. Off.,
Panama City, Fla.

ENS Gregory J. Ellington
BME/Univ. of Minnesota
to PWC Great Lakes, Ill.

ENS William S. Finlayson
BSME/New Mex. State Univ.
to MCAS, Iwakuni, Japan

ENS Shawn A. Follum*
BSCE/Univ. of Utah
to WESTDIV Cont. Off.,
China Lake, Calif.

ENS Phillip M. Gent
BSCE/Univ. of Oregon
to PWC San Francisco Bay,
Oakland, Calif.

ENS Casey P. Henderson
BSCE/Auburn University
to CHESDIV Cont. Off.,
Indian Head, Md.

ENS Dawn M. Hughes
BME/University of Minnesota
to NAS Barbers Point,
Hawaii

ENS Christopher P. Jepsen
BSCE/San Diego State Univ.
SOUTHWESTDIV Cont.
Off., Camp Pendleton, Calif.

ENS Christopher M. Knudsen
BSCE/Cleveland St. Univ.
NAVSUPPACT,
New Orleans, La.

LT Laurie L. Lapiante* ①
BSAE/Univ. of Wyoming
to PWC San Diego, Calif.

ENS Douglas E. McCutchen
BSEE/Univ. of Florida
to NORTHDIV Cont. Off.,
Portsmouth, N.H.

ENS Kirk J. Nelson
BSCE/Univ. of Wash.
to LANTDIV Cont. Off.,
Jacksonville, N.C.

ENS Kristine M. Nielsen
BSCE/Univ. of Wash.
to MARCORBASE,
Camp Pendleton, Calif.

ENS Ricky R. Rodriguez
to NAVSECGRUACT,
Northwest,
Chesapeake, Va.

ENS Leonard C. Schilling
BSCE/Univ. of Washington
to NMCB Four,
Port Hueneme, Calif.

LT Frederick A. Schluster*
BSEE/USNA
to PWC Great Lakes, Ill.

ENS Andrew J. Schulman
MA/Univ. of Wisconsin
to LANTDIV Cont. Off.,
Yorktown, Va.

ENS Gerald E. Sheldon
BSME/MIT
to PWC Norfolk, Va.

ENS Craig B. Spray
BSCE/Univ. of Michigan
to NORTHDIV Cont. Off.,
New London, Conn.

ENS Douglas A. Staunton
BSME/USNA
to NMCB One,
Gulfport, Miss.

ENS Roger F. Wakeman
BSCE/Univ. of N. Hampshire
to ROICC SOUTH,
Naples, Italy

ENS Edward J. Whelan
BSCE/Univ. of Mass.
to SUBASE, New London,
Conn.

ENS Charles S. Willmore
BSSE/USNA
to EFA NW,
Silverdale, Wash.

ENS Kenneth J. Wydajewski*
BSCE/Iowa State Univ.
to NMCB 74, Gulfport, Miss.

ENS Samuel R. York
BECE/Vanderbilt Univ.
to NAVSTA Pearl Harbor,
Hawaii

* With Distinction
‡ Class Commander
① First in Class

Total Quality Leadership Update

The Naval Facilities Engineering Command's 1992 Strategic Plan highlights objectives in four priority areas—customer focus, products and services, people and business practices. Here is a summary of the desired outcomes and goals in each priority area.

Customer focus

Desired outcome: NAVFAC is a key member of each customer's team.

Goals:

- Refine feedback methods that allow customers to define quality.
- Be accepted by our customers as members of their teams.
- Customers participate in major decisions in the delivery of the products/services.
- Improve the customer service skills of our employees.

Products/services

Desired outcome: Deliver products/services meeting our customers' requirements for quality, timeliness and life cycle costs.

Goals:

- By 1994, have support agreements in place for each major customer.
- By 1994, determine which products/services can be provided centrally and which are better provided locally.
- By 1995, adapt the "best of class" in the public and private sectors.

People

Desired outcome: NAVFAC is a superior workplace with opportunities for career growth, professional recognition and job satisfaction.

Goals:

- Support everyone in the improvement of their work processes, and empower our people to make decisions at the lowest possible level.
- Improve the working conditions for our people.
- Continually improve the skills of our workforce, encourage self-development and provide opportunities for personal and professional growth.
- Continually improve the activities, facilities and services contributing to the quality of life for our military members and their families.
- Use teamwork among all components of the command to provide job opportunities for our employees during the period of restructuring.

Business practices

Desired outcome: Innovation, continuous process improvement and teamwork have enabled the delivery of cost-effective, quality products/services.

Goals:

- Delegate authority closest to the delivery points of product/services.
- Use innovative acquisition strategies to support our customers and reduce the delivery time for our products/services.
- By 1993, provide information support responsive to user requirements.
- By 1993, develop a NAVFAC environmental strategy to support the Department of the Navy environmental strategy.
- Establish indicators and communication channels to assess our progress in implementing the strategic plan. ❑

RADM David E. Bottorff, CEC, USN, Announces Retirement

Rear Admiral David E. Bottorff, CEC, USN, commander of the Naval Facilities Engineering Command and chief of civil engineers, has announced that he will retire this fall. The change of command ceremony will be held at 10 a.m. on Friday, Sept. 18, 1992, at Leutze Park in the Washington Navy Yard, Washington, D.C.

March 5, 1992, was the 50th anniversary of the Seabees and Construction Battalion Center Gulfport, Miss., Seabees started the day's celebration by cutting a birthday cake with...what else, a bulldozer! Operating the bulldozer for the event was Equipment Operator Second Class Sam Bryan.

LIQUFAC: A Program to Evaluate Liquefaction Potential

The Naval Facilities Engineering Command Office of Chief Engineer has developed a microcomputer program named LIQUFAC to evaluate soil liquefaction potential. LIQUFAC, short for Liquefaction Potential Analysis for Naval Facilities Sites, was developed under the supervision of Dr. Arthur Wu, a geotechnical engineering consultant at NAVFAC headquarters.

The program evaluates the safety factor against liquefaction for each soil layer during an earthquake and estimates the associated dynamic settlement. The user-friendly program is very useful in assessing the earthquake hazard to Navy's sites located in seismic zone areas.

The use of LIQUFAC, while still in development, resulted in savings of more than $10 million. By using LIQUFAC, Dr. Wu determined that pile foundations costing $10 million called for by a soil investigations report were not necessary for the construction of fuel storage tanks in Diego Garcia. He recommended the use of a reinforced shallow foundation. By eliminating the pile foundations, the cost of the project was reduced by $10 million. LIQUFAC was also used to reduce the cost of a child development center in San Diego, Calif., by more than $500,000.

NAVFAC intends to expand the LIQUFAC program and incorporate it into NAVFAC Design Manual, DM-7.3, Soil Dynamics. For more information about LIQUFAC, call Dr. Wu at (703) 325-0043.

This project was supported by the Engineering Investigation Fund ($28,000).

Membership Drive Underway for Association of Navy CEC Officers

The Personal Data Book, which is published by the Navy Civil Engineer Corps Officers (ANCECO), will be reissued in October 1992. If you wish to be listed in the Personal Data Book, please complete the data form and mail it to Lieutenant Commander Charlie Khan, CEC, USN, Secretary-Treasurer, ANCECO, c/o NAVFACENGCOM (Code 09M2), 200 Stovall Street, Alexandria, Va. 22332-2300.

The deadline is Sept. 11, 1992. At the same time, you may renew membership in ANCECO and order a copy of the book by enclosing a check for $12 payable to ANCECO. Officers not interested in an ANCECO membership are also requested to forward a completed form to help make this edition of the data book complete.

ANCECO DATA FORM

PART I. Personal Information

NAME (Last, First, Middle Initial)

RANK | NICKNAME | STATUS (A Active, R Retired, X Reserve)

HOME MAILING ADDRESS

CITY | STATE | LIST — MARK AN "X" IN THE BLOCK IF YOU WANT YOUR HOME PHONE NUMBER LISTED. OTHERWISE, LEAVE BLANK.

ZIP CODE | HOME TELEPHONE NUMBER

COLLEGES/UNIVERSITIES ATTENDED | DEGREES

LICENSES AND STATES

PROFESSIONAL ASSOCIATIONS/SOCIETIES

PART II. Retired and Reserve Officer Professional Information (Voluntary)

POSITION/TITLE

COMPANY NAME

BUSINESS MAILING ADDRESS

CITY | STATE

ZIP CODE | BUSINESS TELEPHONE NUMBER

PART III. Family Information

*RELATION NAME (First and Middle Only) | **YEAR BORN

*W - Wife, H - Husband, S - Son, D - Daughter
** Children only.

NOTES:
1. PRINT NEATLY. USE BLACK INK. ONE LETTER PER SQUARE - ONE SQUARE EQUALS ONE SPACE.
2. USE STANDARD RANK ABBREVIATIONS, E.G. (ENS, CDR, CAPT, RADM, ETC). DO NOT USE USN OR USNR EXCEPT FOR RESERVE RETIREES. INCLUDE THIS INFORMATION IN THE "RANK" BLOCK.
3. USE STANDARD REGISTRATION ABBREVIATIONS, E.G. (PE, RA, EIT, RLS, PP, ETC).
4. USE SOCIETY ABBREVIATIONS, E.G. (ASCE, SAME, IEEE, etc). ONLY LIST PROFESSIONAL ORGANIZATIONS.

Membership is voluntary. 1992 Personal Data Books will be provided to members only.

(ANCECO FORM Rev Feb 92)

MAIL TO...

LCDR Charlie Khan, CEC, USN
Secretary-Treasurer, ANCECO
c/o NAVFACENGCOM (Code 09M2)
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Secretary of the Navy...

Continued from page 27

worse by the fact that it seems, sometimes, as though every one in this town (Washington, D.C.) has a different idea about what you should do...and how much money you should spend to do it.

MILCON moratoriums, hiring freezes, priority placement programs, and worst of all—the threat of RIFs—make these some of the most turbulent and uncertain times most of us have ever experienced. The only way we are going to get through them with our capabilities intact is to be ruthlessly innovative...to challenge every one of our old assumptions and habits...to reexamine every aspect of what we do...to take on this new era as a challenge and an opportunity...and *not* a threat.

But I'm preaching to the choir, here, because this community, under Admiral Bottorff's leadership, was among the first to see that the world was changing...and that the Navy would need to change with it.

Because of your foresight...because of your creative approach to evolving requirements...because of your commitment to quality...because of your success in shrinking overhead and building more efficient management systems...NAVFAC is well positioned to weather much of the turbulence lying ahead.

I think that's extremely important, because *you* will be the key players in many of the Navy Department's priorities over the next few years—including preserving the quality of life of our people, closing bases, protecting and renewing the environment, and maintaining naval facilities readiness in an austere budget environment.

All of that is vitally important for the simple reason that the United States will depend in this new world—more than ever before—on its naval power. As the nation closes down its overseas bases...as it brings its troops home...as it turns the focus of its attention on its problems at home...it will rely more and more on a forward-deployed and properly supported naval forces to influence events abroad, to deter threats to our overseas interests, to respond to regional crisis, and to maintain ties with our friends and allies.

The Navy and the Marine Corps have been called on to do those things continuously since before the War of 1812—and they will be asked to do those things well into the 21st century...and, ladies and gentlemen, they can't do it without you—of NAVFAC, of the Civil Engineer Corps, and of the Seabees. ❑

Have you considered the Reserves?

For a challenging, rewarding career...

If you are a young construction professional in civilian practice or civil service, or are a graduating engineering or architecture college senior who has already selected a civilian career path, the Reserve Civil Engineer Corps may have a place for you as a commissioned officer.

Qualified young professionals have the chance to achieve tremendous personal and professional satisfaction through...

✔ Direct appointment as an ensign, Civil Engineer Corps, United States Naval Reserve

✔ Challenging assignments within reserve Naval Construction Force units in your geographic locale, in areas paralleling active duty in the Seabees or in facilities management

✔ Annual active duty for training that is meaningful and rewarding

✔Development of leadership and technical skills that will carry over directly into your civilian profession

✔ New and lasting friendships and associations with other top-notch construction professionals

✔ Pay and responsibility that increase as you grow and advance

✔ A Naval Reserve retirement package for a little something extra in your old age

✔ Finally, and most importantly, the pride in knowing that you are helping preserve the freedom of your country as you grow in your profession

Here's what you can do...

If you are a young engineer or architect, please call a Reserve representative listed below.

LCDR Scott Cleveland, CEC, USN
Atlantic Region, RNCF
Naval Base, Building NH47
Charleston, SC 29408-5192
Phone: (803) 743-2650
1-800-535-7936
AV 563-2650

LCDR Doug Stauffer, CEC, USN
Pacific Region, RNCF
Naval Training Center, Building 304
San Diego, CA 92133-1000
Phone: (619) 524-6846
AV 524-6846

Or, contact an active duty EFD Accessions Officer listed on the inside front cover for further information and details.

Navy Civil Engineer, Code OODA
Naval Facilities Engineering Command
200 Stovall Street
Alexandria, VA 22332-2300

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